Before the
FEDERAL COMMUNICATIONS COMMISSION
Washington, DC, 20544

In the Matter of: Enabling Next-Generation Terrestrial Positioning, Navigation, and Timing and 5G: (A Plan for the Lower 900 MHz Band) (902-928 MHz)	Docket No. 24-240, RM-11989

COMMENTS OF AVERY DENNISON CORPORATION ON AND OPPOSITION TO NEXTNAV, INC. PETITION FOR RULEMAKING[1]

INTRODUCTION

While NextNav Inc.'s ("NextNav") Petition for Rulemaking ("Petition") seeks to address the important issue of GPS resiliency, it proposes to do so in a way that will (a) fail to effectively solve the issue, (b) have a significant and disproportionate negative impact on public safety and national security, supply chain resiliency, logistics, healthcare, and industrial and retail operations, and (c) result in a financial windfall for NextNav—essentially ensuring exclusivity, typically a billion dollar acquisition, at the expense of American consumers. Further, the Petition, which requests that the Commission begin a proceeding to radically restructure the 902-928 MHz band ("Lower 900 MHz band"), is based on inaccurate premises and ignores, or at least significantly downplays, the substantial potential negative impacts described above. The Commission should reject NextNav's Petition because of the substantial negative complications (explained further below) for essential business operations critical to the United States economy.

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[1] Avery Dennison has also submitted comments in collaboration with Impinj, Inc., r-pac International Corp., and Zebra Technologies Corporation (the "Ad Hoc RAIN RFID Coalition"), which these comments are intended to complement.

AVERY DENNISON AND RADIO FREQUENCY IDENTIFICATION (“RFID”)

Avery Dennison Corporation (NYSE: AVY) is a global materials science and digital identification solutions company headquartered in Mentor, Ohio. Founded in 1935, it has operations in over 50 countries with approximately 35,000 employees. Avery Dennison provides a wide range of branding and information solutions that optimize labor and supply chain efficiency, reduce waste, advance sustainability, circularity and transparency, and better connect brands and consumers. Our products and solutions include labeling and functional materials, radio frequency identification (RFID) inlays and tags, software applications that connect the physical and digital, and a variety of products and solutions that enhance branded packaging and carry or display information that improves the customer experience.

As the world’s leading provider of UHF Radio Frequency Identification (“RFID”) solutions across multiple industries including logistics and supply chain, retail, apparel, healthcare, and food, Avery Dennison can attest that the Lower 900 MHz band is critical to a broad array of stakeholders who rely on its full frequency range to carry out tasks vital to the United States economy and American consumers.[2]

RFID devices are Part 15 radio devices that operate in the Lower 900 MHz band. The Lower 900 MHz band is a robust and rapidly growing ecosystem of licensed and unlicensed services that co-exist with one another to the enormous benefit of the public and our economic infrastructure.

Indeed, RFID technology and devices are embedded in and play a key role in many essential industries and activities, including supply chain and logistics operations (e.g., parcel tracking and delivery, verification and authentication of package/case contents), retail operations (e.g., inventory control, loss prevention, and self-checkout), healthcare and pharmaceuticals (e.g., temperature and time tracking for cold storage pharmaceuticals, accuracy of package contents for surgery and other procedures), food waste reduction, air travel (e.g., Delta Air Lines baggage tags), and industrial automation. Tens of billions of RFID tags and tens of millions of RFID readers have been deployed to facilitate the activities described above.[3]

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[2] RFID is a wireless technology consisting of RFID readers and RFID labels that uses radio waves to identify, track, and manage items.

Moreover, RFID has a long history of enabling supply chain accuracy and resiliency and retail operations. The roots of RFID can be traced back to World War II and started to see commercial adoption in the 1970's and 80's.[4] In 1999, the Auto-ID Center was formed at MIT to begin the groundwork on standardization. Procter & Gamble, Gillette, and the Uniform Code Council funded the effort. In 2003, as the commercial value started to become more widely recognized, WalMart began working with suppliers to track pallets with RFID, followed by the Walton School of Business at the University of Arkansas opening an RFID research center in 2005. Also in 2005, the U.S. Department of Defense began implementing passive RFID to track shipments and mandating supplies to use the technology. Standards also consolidated that year when the European Article Number (EAN) and the Uniform Code Council (UCC) merged to form Global Standards One (GS1). GS1 is today the primary global standards authority for RFID.

In 2021, Accenture published a white paper stating, "RFID is booming" … "with 93% of retailers surveyed using RFID… a huge increase since our previous RFID study in 2018."[5] In 2015

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[3] For example, Avery Dennison's Case Verification solution provides automated, item-level shipment and receipt verification without requiring any visual or manual inspection, resulting in 100% shipping accuracy throughout the supply chain. See https://rfid.averydennison.com/content/rfid/na/en/home/news-insights.html for additional RFID case studies.

[4] https://www.rfidjournal.com/expert-views/the-history-of-rfid-technology/76202/

[5] https://www.accenture.com/content/dam/accenture/final/a-com-migration/r3-3/pdf/pdf-155/accenture-rfid-in-retail.pdf

Target announced rolling out RFID to all of its 1,800 stores.[6] On a 2019 conference call with investors, Nike CEO Mark Parker said, "RFID gives us the most complete view of our inventory that we have ever had. It's quickly becoming the most precise tool in our arsenal to meet an individual consumer specific need at the exact right moment."[7] IDTechEx reports that 33 billion UHF RFID tags were sold in 2022 representing a 20% year on year increase over previous years.[8] In 2023, UPS announced on its earnings call that it plans to deploy RFID throughout its U.S. network (over 1,000 facilities).[9] In 2023, Amazon launched its first Just Walk Out technology stores using RFID for-self checkout.[10]

If the Lower 900 MHz band were to be reconfigured as requested by NextNav, it is highly likely that RFID devices in the United States will experience significant disruption and interference, resulting in their failure to function as designed. The economic fallout of disrupting the functioning of RFID devices would be grim. As described above, RFID is the technology that allows for expedient and accurate authentication of items and is integral to *billions of dollars* of economic transactions in the United States alone. RFID connects billions of items to the internet daily, including package tracking, luggage tagging, medical inventorying and toll reading, among other items. Industries that rely on identifying, locating, authenticating and engaging with such items depend on RFID's ability to provide these services without interference. Major supply chain disruptions would ensue, and significant inaccuracies in supply chains, logistics, retail, healthcare, and air travel would occur, resulting in significantly decreased efficiencies and increased risks and costs to American consumers.

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[6] https://www.retailtouchpoints.com/features/news-briefs/target-to-roll-out-rfid-in-all-stores

[7] https://www.impinj.com/library/blog/rain-rfid-helps-nike-just-do-it-despite-supply-chain-challenges#:~:text=%22RFID%20gives%20us%20the%20most%20complete%20view,and%20CEO%2C%20said%20in%20a%20June%202019

[8] https://www.idtechex.com/en/research-article/rfid-market-trends-for-2023-and-the-next-five-years/28940

[9] https://www.supplychaindive.com/news/ups-rfid-tag-smart-package-initiative-expands-2023/642338/

[10] https://www.aboutamazon.com/news/retail/amazon-just-walk-out-rfid-technology

The Commission should consider the proven success of RFID deployment, the continued growth on the Lower 900 MHz band, and the potentially devastating impact on multiple industries and the economy when considering this Petition.

BACKGROUND

On April 16, 2024, NextNav Inc. filed a petition for rulemaking titled "Enabling Next-Generation Terrestrial Positioning, Navigation, and Timing ('PNT') and 5G: A Plan for the Lower 900 Band (902-928 MHz)." The Petition seeks to reorganize the Location Monitoring Service (LMS) band by restructuring its current block arrangement into two contiguous segments: one for M-LMS licensees and one for non-M-LMS licensees. Specifically, the proposal includes expanding the M-LMS portion of the band from 14 to 15 megahertz and consolidating the remaining non-M-LMS frequencies into a contiguous 11-megahertz block. NextNav's Petition also requests the removal of restrictions on M-LMS operations including the number of spectrum licenses an entity can hold, the types of services that can be provided, and the real-time interconnection obligations. As NextNav concedes, these changes are intended to repurpose the band to accommodate its proprietary technologies and provide it with exclusivity in the band.

ARGUMENT

NextNav's Petition argues that GPS technology is susceptible to exploitation and that a supplement to GPS is needed. There is, however, nothing new in this claim. There are a wide variety of approaches to improve GPS under consideration by both the private and public sectors. Most importantly, the solution that NextNav proposes, wholly restructuring the Lower 900 MHz band to bestow it with a *de facto* exclusive license in that critically important band, would not solve this problem. Indeed, there is no evidence that the NextNav approach is the best solution available, nor is there a technical requirement that NextNav use the Lower 900 MHz band for these purposes. The major disruption caused by NextNav's proposed solution would create more problems than it would solve.

I. There is no technical need for NextNav to use the Lower 900 MHz band.

There is no technical requirement for NextNav's PNT network to operate within the Lower 900 MHz (902-928 MHz) band. In fact, due to its existing congestion and the diverse range of unlicensed devices already operating within this band, it is likely one of the least reliable or desirable locations for such a network.

The Lower 900 MHz band is heavily used by a wide array of unlicensed devices, including industrial automation devices and consumer electronics, as well as RFID systems. Introducing a high-power, licensed PNT network into this spectrum will exacerbate interference issues, inevitably degrading performance for existing users, and also put at risk the systems proposed by NextNav.

Licensed spectrum bands, on the other hand, offer the same technical capabilities as the Lower 900 MHz band but with far greater control and fewer opportunities for interference. Operating in a licensed band would allow NextNav to manage its network with more precise control over frequency usage, minimizing the risk of interference with other systems and ensuring a more stable environment for its PNT services. That NextNav is seeking an exclusive license in the Lower 900 MHz band strongly suggests that the main thrust of its effort is to receive the spectrum at no cost.

II. Co-existence between NextNav services and RFID systems is unlikely.

Coexistence between NextNav's proposed geolocation services and existing RFID systems is fraught with technical challenges, if not outright impossibilities, due to the fundamental differences in signal characteristics and operational requirements. The technical issues created by this Petition for RFID are twofold.

First, if the privileges and rights are afforded to NextNav as requested in the Petition, the likelihood for interference between devices impacting functionality increases dramatically. RFID systems use a specific channel configuration with very small packet sizes, functioning under a globally published protocol. In contrast, geolocation services, particularly those designed for broad coverage, require higher power levels and wider bandwidths. This disparity makes it extremely difficult for both services to operate without a high risk of interference, particularly in dense urban environments, where both geolocation services and RFID systems are likely to be in heavy use. In these settings, the potential for signal congestion and degradation is greatly increased, leading to compromised performance for both services.

Second, given the likely interference, NextNav's hierarchy on the Lower 900 band would essentially give it the right to request that Part 15 devices cease operation. As described above, there would be a significant negative impact on essential services and industries in the United States, ultimately causing harm to the employees of companies reliant on RFID and on American consumers.

NextNav's assertion that coexistence should be achievable overlooks the fact that Part 15 devices were not intended to coexist with high-power, broadband systems like those proposed in its Petition. The nature and intensity of interference from such systems could overwhelm the adaptive capabilities of Part 15 devices, leading to degraded performance or even complete operational failures. This is particularly concerning for the multitude of industries that rely on the consistent and reliable functioning of these devices, such as RFID systems used in supply chain management, logistics, retail operations, healthcare, and industrial automation. In fact, NextNav as a licensed service would have priority over Part 15 devices operating in the band and would be fully justified in forcing such devices to move, alter their operating characteristics, or shut down. Given the ubiquity of RFID devices (and all the other unlicensed devices operating in the band), Part 15 devices will most certainly create interference, and it is all but guaranteed that there will be data loss – a major issue for an emergency communications system. It would be no surprise, therefore, that once it has its exclusive licenses in the Lower 900 MHz band, NextNav would start to alter or foreclose the use of RFID devices in the band.

III. NextNav has not provided adequate technical information.

While NextNav asserts in its Petition that it is completing technical analyses to address representative uses of the Lower 900 MHz Part 15 devices, it has provided no useful information to users of the band to review. There is no reason to believe that NextNav's technical analyses would identify or resolve all potential interference issues. The diversity of Part 15 devices and their applications means that interference impacts could vary widely, and a one-size-fits-all solution is unlikely to be sufficient. Additionally, NextNav's purported commitment to working with unlicensed users to understand their spectrum requirements does not eliminate the inherent risks posed by its reorganization plan. It would be entirely backwards for the Commission to begin a rulemaking proceeding to restructure the Lower 900 MHz band, and only later for stakeholders to have the opportunity to review the technical issues.

IV. Restructuring the band could impose enormous costs across the economy now and in the future.

NextNav's proposal to restructure the Lower 900 MHz band could not be implemented without significant modifications to existing RFID systems and other technologies currently operating in the band. The cost of making such changes, given the billions of devices and the enormously wide range of organizations that rely upon them, would be overwhelming – for the organizations, for consumers, and for the entire economy. Understandably, NextNav's Petition emphasizes the potential benefits of the proposed reorganization for developing NextGen PNT systems, but it fails to address the financial and operational impacts such a reorganization would impose on others, including American consumers.

In fact, RFID adoption is growing at exponential rates and so are predictive analytics, machine learning, and artificial intelligence. RFID technology is rapidly evolving and holds immense promise for revolutionizing various industries. Its applications are already transforming retail, healthcare, manufacturing, logistics, and many other sectors. In the future, RFID will play an even more critical role in enhancing efficiency, accuracy, and traceability in supply chains, improving inventory management, reducing waste, and ensuring product safety. It will continue to improve interactions in retail and inform shoppers of the provenance of the products they purchase. It will contribute to the prediction of supply patterns, allowing for proactive supply adjustments during a global pandemic, environmental crisis, natural disaster or impact from geopolitical and military conflict. It will reduce food waste by recommending inventory circulation and distribution, impact how products are recycled, ensure damaged or old lithium batteries are not loaded on aircraft, reduce theft in retail, help cancer patients manage and remember to take their medications, and safely store hazardous materials.

Nextnav's Petition not only ignores the existing and future importance of RFID technology to the United States and its citizens, it threatens to undermine it, harming entire industries and consumers while also negatively impacting national security and public safety. It is crucial that the FCC reject NextNav's Petition to protect the long-term benefits and potential of RFID technology.

CONCLUSION

The NextNav Petition is based on the false premise that the Lower 900 MHz band is not widely used and can easily be restructured. Restructuring the band for the benefit of one company would almost certainly destroy the active, enormous, and rapidly growing ecosystem of RFID and other unlicensed devices that now use the band. The cost of rebuilding this ecosystem would greatly exceed any potential benefits, where real or perceived, that such a restructuring might produce. Accordingly, Avery Dennison urges the Commission to reject the NextNav Petition for Rulemaking.

Respectfully submitted,

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